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Can American Industry Adopt The ISA System of Fits?

by
John Gaillard
Mechanical Engineer
American Standards Association

AN AMERICAN TENTATIVE STANDARD for fits between cylindrical parts was set up in 1925 under the procedure of the American Standards Association (ASA).[2] The ASA Committee that developed it was reorganized in 1930 to determine whether the standard should be revised or supplemented in view of the progress made during the five years of its existence.

A subcommittee of the new ASA committee[3] decided last year that due consideration should be given to a proposal developed by a technical committee of the International Standards Association (ISA),[4] the first part of which has now practically reached its final shape. This gives a series of recommended fits for nominal diameters from about 0.04 to 7 in. (1 to 180 mm), or almost the same range as covered by the American Tentative Standard of 1925 (⅛ in. to 8½ in.) for classes of fit 1 to 6, inclusive. The ISA committee has also completed a draft for limits for parts up to 500 mm (about 20 in.), and a preliminary study of limits for parts up to 1600 mm (about 63 in).

[1] Abstract of Dr. Gaillard's article, *American Machinist*, June 6, 1934.

[2] Tolerances, Allowances and Gages for Metal Fits (B4a-1925).

[3] Subcommittee members: R. E. W. Harrison, chairman; P. V. Miller, secretary; F. E. Banfield; H. B. Hambleton; F. O. Hoagland; W. C. Mueller; D. W. Ovaitt; and H. Van Keuren.

[4] The ISA is a federation of national standardizing bodies in 18 countries, including the ASA. Its main purpose is to make recommendations for the unification of national standards. Adoption of these recommendations by the member-bodies of the ISA is voluntary.

Limit gages, used to control standardized fits, are a major factor in securing high quality of product at the lowest possible cost.

Recommended ISA Fits

These are given in Tables 1 and 2 for the Basic Hole and the Basic Shaft system, respectively. In the original tables the limits, or rather the permissible variations from nominal size, are given in microns (one micron equals with close approximation 0.00004 in.). In Tables 1 and 2, these values have been converted to ten-thousandths of an inch ("tenths"). The nine subdivisions of the range of nominal diameters given in the extreme left hand columns, have also been rounded.

For example, the diameter 10 mm which is very

Proposed ISA System of Fits

These tables show the key to the International Standards Association's Standard Fits. If American industry decides to adopt this system, it may be necessary to make slight adjustments of some of the values shown.

Table I, Basic Hole System
Limits in tenthousandths of an inch

Nominal Diameter (inches) from	to [1]	Hole H6 basic to	SHAFT LIMITS g5		h5		j5		k5		m5		n5	
0.04	1/8	+3	-1	-3	0	-2	+1.5	-0.5			+3	+1	+4	+2.5
1/8	1/4	+3	-1.5	-3.5	0	-2	+1.5	-0.5			+3.5	+1.5	+5	+3
1/4	3/8	+3.5	-2	-4	0	-2.5	+1.5	-1	+3	+0.5	+5	+2.5	+6	+4
3/8	11/16	+4	-2.5	-5.5	0	-3	+2	-1	+3.5	+0.5	+6	+3	+8	+5
11/16	1 1/4	+5	-3	-6	0	-3.5	+2	-1.5	+4	+1	+7	+3	+9	+6
1 1/4	2	+6	-3.5	-8	0	-4	+2.5	-2	+5	+1	+8	+3.5	+11	+7
2	3 1/4	+7	-4	-9	0	-5	+2.5	-3	+6	+1	+9	+4	+13	+8
3 1/4	4 3/4	+9	-5	-11	0	-6	+2.5	-3.5	+7	+1	+11	+5	+15	+9
4 3/4	7	+10	-6	-13	0	-7	+3	-4	+8	+1	+13	+6	+18	+11

Hole H7 basic to	SHAFT LIMITS d9		e8		f7		g6		h6		j6		k6		m6		n6		p6 [2]	
+3.5	-8	-18	-6	-11	-3	-6	-1	-4	0	-3	+2.5	-0.5			+3.5	+1	+5	+2.5	+6	+3.5
+5	-12	-24	-8	-15	-4	-9	-1.5	-5	0	-3	+3	-0.5			+5	+1.5	+6	+3	+8	+5
+6	-16	-30	-10	-19	-5	-11	-2	-6	0	-3.5	+3	-1	+4	+0.5	+6	+2.5	+7	+4	+9	+6
+7	-20	-37	-13	-23	-6	-13	-2.5	-7	0	-4	+3	-1	+5	+0.5	+7	+3	+9	+5	+11	+7
+8	-26	-46	-16	-29	-8	-16	-3	-8	0	-5	+3.5	-1.5	+6	+1	+8	+3	+11	+6	+14	+9
+10	-31	-56	-20	-35	-10	-20	-3.5	-10	0	-6	+4	-2	+7	+1	+10	+3.5	+13	+7	+17	+10
+12	-39	-69	-24	-42	-12	-24	-4	-11	0	-7	+5	-3	+8	+1	+12	+4	+15	+8	+20	+13
+14	-47	-81	-28	-50	-14	-28	-5	-13	0	-9	+5	-3.5	+10	+1	+14	+5	+18	+9	+23	+15
+16	-57	-96	-33	-58	-17	-33	-6	-15	0	-10	+6	-4	+11	+1	+16	+6	+20	+11	+27	+17

Nominal Diameter (inches) from	to [1]	Hole H8 basic to	SHAFT LIMITS d10		e9		f8		h8		h7		j7		k7		m7		n7	
0.04	1/8	+6	-8	-24	-6	-15	-3	-8	0	-6	0	-3.5	+3	-1					+6	+2.5
1/8	1/4	+7	-12	-31	-8	-20	-4	-11	0	-7	0	-5	+3.5	-1					+8	+3
1/4	3/8	+9	-16	-39	-10	-24	-5	-14	0	-9	0	-6	+4	-2	+6	+0.5	+8	+2.5	+10	+4
3/8	11/16	+11	-20	-47	-13	-30	-6	-17	0	-11	0	-7	+5	-2.5	+7	+0.5	+10	+3	+12	+5
11/16	1 1/4	+13	-26	-59	-16	-36	-8	-21	0	-13	0	-8	+5	-3	+9	+1	+11	+3	+14	+6
1 1/4	2	+15	-31	-71	-20	-44	-10	-25	0	-15	0	-10	+6	-4	+11	+1	+13	+3.5	+17	+7
2	3 1/4	+18	-39	-87	-24	-53	-12	-30	0	-18	0	-12	+7	-5	+13	+1	+16	+4	+20	+8
3 1/4	4 3/4	+21	-47	-102	-28	-63	-14	-35	0	-21	0	-14	+8	-6	+15	+1	+19	+5	+23	+9
4 3/4	7	+25	-57	-120	-33	-73	-17	-42	0	-25	0	-16	+9	-7	+17	+1	+22	+6	+26	+11

Hole H11 basic to	SHAFT LIMITS a12 [2]		b11 [2]		c11 [2]		d11 [2]		h11	
+24	-33	-69	-20	-44	-13	-36	-8	-31	0	-24
+30	-51	-98	-31	-61	-19	-48	-12	-41	0	-30
+35	-71	-130	-41	-77	-26	-61	-16	-51	0	-35
+43	-91	-161	-55	-98	-33	-77	-20	-63	0	-43
+51	-122	-205	-71	-122	-41	-93	-26	-77	0	-51
+63	-157	-256	-91	-154	-53	-116	-31	-94	0	-63
+75	-197	-315	-114	-189	-69	-144	-39	-114	0	-75
+87	-252	-390	-142	-228	-83	-169	-47	-134	0	-87
+98	-307	-465	-173	-272	-98	-197	-57	-156	0	-98

Table II, Basic Shaft System
Limits in tenthousandths of an inch

Nominal Diameter (inches) from	to [1]	Shaft h5 basic to	HOLE LIMITS G6		H6		J6		K6		M6		N6	
0.04	1/8	-2	+1	+4	0	+3	-1.5	+1			-3	0	-4	-1.5
1/8	1/4	-2	+1.5	+5	0	+3	-1.5	+1.5			-3.5	-0.5	-5	-2
1/4	3/8	-2.5	+2	+6	0	+3.5	-1.5	+2	-3	+1	-5	-1	-6	-3
3/8	11/16	-3	+2.5	+7	0	+4	-2	+2.5	-3.5	+1	-6	-1.5	-8	-3.5
11/16	1 1/4	-3.5	+3	+8	0	+5	-2	+3	-4	+1	-7	-1.5	-9	-4
1 1/4	2	-4	+3.5	+10	0	+6	-2.5	+4	-5	+1	-8	-1.5	-11	-5
2	3 1/4	-5	+4	+11	0	+7	-2.5	+5	-6	+1.5	-9	-2	-13	-6
3 1/4	4 3/4	-6	+5	+13	0	+9	-2.5	+6	-7	+1.5	-11	-2.5	-15	-6
4 3/4	7	-7	+6	+15	0	+10	-3	+7	-8	+1.5	-13	-3	-18	-8

Shaft h6 basic to	HOLE LIMITS D9		E8		F7		G7		H7		J7		K7		M7		N7		P7 [2]	
-3	+8	+18	+6	+11	+3	+6	+1	+5	0	+3.5	-2.5	+1			-3.5	0	-5	-1.5	-6	-3
-3	+12	+24	+8	+15	+4	+9	+1.5	+6	0	+5	-3	+2			-5	0	-6	-1.5	-8	-3
-3.5	+16	+30	+10	+19	+5	+11	+2	+8	0	+6	-3	+3	-4	+2	-6	0	-7	-1.5	-9	-3.5
-4	+20	+37	+13	+23	+6	+13	+2.5	+9	0	+7	-3	+4	-5	+2.5	-7	0	-9	-2	-11	-4
-5	+26	+46	+16	+29	+8	+16	+3	+11	0	+8	-3.5	+5	-6	+2.5	-8	0	-11	-3	-14	-6
-6	+31	+56	+20	+35	+10	+20	+3.5	+13	0	+10	-4	+6	-7	+3	-10	0	-13	-3	-17	-7
-7	+39	+69	+24	+42	+12	+24	+4	+16	0	+12	-5	+7	-8	+3.5	-12	0	-15	-3.5	-20	-8
-9	+47	+81	+28	+50	+14	+28	+5	+19	0	+14	-5	+9	-10	+4	-14	0	-18	-4	-23	-9
-10	+57	+96	+33	+58	+17	+33	+6	+21	0	+16	-6	+10	-11	+5	-16	0	-20	-5	-27	-11

Nominal Diameter (inches) from	to [1]	Shaft h7 basic to	HOLE LIMITS H8		J8		K8		M8		N8	
0.04	1/8	-3.5	0	+6	-3	+3					-6	-0.5
1/8	1/4	-5	0	+7	-3.5	+3.5					-8	-1
1/4	3/8	-6	0	+9	-4	+5	-6	+2.5	-8	+0.5	-10	-1
3/8	11/16	-7	0	+11	-5	+6	-7	+3	-10	+1	-12	-1
11/16	1 1/4	-8	0	+13	-5	+8	-9	+4	-11	+1.5	-14	-1
1 1/4	2	-10	0	+15	-6	+9	-11	+5	-13	+2	-17	-1
2	3 1/4	-12	0	+18	-7	+11	-13	+6	-16	+2	-20	-1.5
3 1/4	4 3/4	-14	0	+21	-8	+13	-15	+6	-19	+2.5	-23	-1.5
4 3/4	7	-16	0	+25	-9	+16	-17	+8	-22	+3	-26	-1.5

Shaft h8 basic to	HOLE LIMITS D10		E9		F8		H8	
-6	+8	+24	+6	+15	+3	+8	0	+6
-7	+12	+31	+8	+20	+4	+11	0	+7
-9	+16	+39	+10	+24	+5	+14	0	+9
-11	+20	+47	+13	+30	+6	+17	0	+11
-13	+26	+59	+16	+36	+8	+21	0	+13
-15	+31	+71	+20	+44	+10	+25	0	+15
-18	+39	+87	+24	+53	+12	+30	0	+18
-21	+47	+102	+28	+63	+14	+35	0	+21
-25	+57	+120	+33	+73	+17	+42	0	+25

Shaft h11 basic to	HOLE LIMITS A12 [2]		B11 [2]		C11 [2]		D11 [2]		H11	
-24	+33	+69	+20	+44	+13	+36	+8	+31	0	+24
-30	+51	+98	+31	+61	+19	+48	+12	+41	0	+30
-35	+71	+130	+41	+77	+26	+61	+16	+51	0	+35
-43	+91	+161	+55	+98	+33	+77	+20	+63	0	+43
-51	+122	+205	+71	+122	+41	+93	+26	+77	0	+51
-63	+157	+256	+91	+154	+53	+116	+31	+94	0	+63
-75	+197	+315	+114	+189	+69	+144	+39	+114	0	+75
-87	+252	+390	+142	+228	+83	+169	+47	+134	0	+87
-98	+307	+465	+173	+272	+98	+197	+57	+156	0	+98

1- The subranges include the high limiting figure, thus: From above 0.04 inch to 1/8 inch, inclusive, and so on
2- Tentative value

Courtesy American Machinist

close to 25/64 in., has been rounded to 3/8 in. The purpose of this rounding is greater simplicity in the presentation of the data. However, if American industry decides to adopt the ISA system, it may be necessary slightly to adjust some of the values given here in order to obtain the complete practical interchangeability of fits which is the ultimate purpose of an internationally unified system.

In the meantime, the minor variations caused by the rounding applied in Tables 1 and 2 affect in no way the question as to whether the nature and variety of the recommended ISA fits answer the general requirements of the industry in this country.

Significance of Present Revision

Nationally, as well as internationally, the question as to what the next American Standard for fits should be, is highly important.

If the United States and in the course of time also Great Britain, should adopt the ISA system, world uniformity in the matter of cylindrical fits would be practically assured.[5] Once attained, this uniformity will probably become permanent, even though periodical changes may be required due to progress in technical production methods. This progress is bound to develop along the same lines in all major industrial countries.

On the other hand, if American industry, in revising its tentative standard of 1925, prefers to adopt a system different from the ISA proposal, the chance for ultimate international agreement will probably become very small. In fact, it may be expected that, say within the next ten years, the new American Standard—whatever this may be—will become widely introduced into practice in this country because of the growing need for a system of fits in many branches of industry that so far have not paid any particular attention to this problem.

Likewise, the ISA system promises to become firmly rooted on the European Continent. France and Germany have already adopted and published the first part of the ISA proposal (briefly discussed here) as their national standards and several other countries are expected to follow in the near future. If ten years from now the fit systems commonly used in the U. S. and Europe differ to any considerable extent, it will be very difficult, if not impracticable to reach a compromise between them, even though by that time international unification may appear to be more desirable than ever before. For this reason, the decision which American industry must take in this matter should be weighed with the greatest care.

[5] No forecast about the attitude of British industry can be made, but it is interesting to note that the British have adopted 68 F as their national standard reference temperature for gages (instead of 62 F), for the sake of international uniformity.

Minimum Standards for Toxic Agents Are Set Up in England

By agreement between the Ministry of Agriculture and the British Insecticide Manufacturers' Association, a voluntary system for ensuring minimum percentages of active toxic agents in many insecticide and fungicide products has been set up.

As a part of this agreement, the Ministry undertook to prepare methods for testing insecticides. After two years of trial, consideration is now being given to the preparation of standard specifications and methods of testing insecticides.

Canadians Name Group On Steel Construction

The Structural Steel Committee of the Canadian Engineering Standards Association has appointed a subcommittee on Steel Construction. Groups on Buildings, Bridges, and Structural Welding were named.

The first two committees will consider the revision of working stresses in accordance with proposed changes in material specifications. The welding group will study welding processes, qualification of welders, tests and inspection, design and unit stresses.

South Africa to Have Standards Institution

A South African Standards Institution is in process of formation. Hitherto, a Standards Committee in South Africa has been functioning as a branch of the British Standards Institution. The proposed South African Standards Institution will operate independently as the national standardizing organization for the South African Union.

Agnew Named Member of Research Council

P. G. Agnew, secretary, American Standards Association, has been appointed a member of the National Research Council of the National Academy of Sciences. President Roosevelt has requested the Academy to perpetuate the research council.

Further Standardization Expected In Locomotive and Car Building

The question of standardization and simplification of locomotive and car parts is of major importance in any scheme for reducing the cost of shop and running repairs. Practically all the railroads have established standards of their own for each item, but in the majority of cases it seems probable that the number of different sizes or types of a given item could be reduced to great advantage, and without damage to the value of those items in use.

It is of course impossible to plan the operation of a locomotive shop in the same way that the operation of a production shop could be planned. At the same time a very considerable amount of improvement seems possible in the way of establishing regular schedules for repairing locomotives and cars, to a much greater extent than has yet been accomplished by the railroads as a whole.

The matter of standardization and simplification, particularly the latter, will be of even greater importance if any move is made to consolidate shop facilities, either on individual railroads or between two or more railroads. This subject is being studied at present by the Western Regional Director of the Coordinator's organization, in cooperation with representatives of the Western Regional Coordinating Committee of the railroads, but no recommendations have yet been made.

It seems probable that a certain amount of such consolidation would result in economy to all the roads, provided that the present program of the Coordinator in connection with standardization and simplification is carried forward as planned.

The Coordinator's office is working continuously with the Purchases and Stores Division and with the American Railway Engineering Association, in its effort to promote the development, adoption, and effective use of sound standards for items common to all roads. Some progress has already been made along this line, but it is negligible when compared with the opportunities now recognized in this field.

There are literally hundreds of items which are made in a great range and diversification of types and dimensions for different railroads, and which could be made in a small fraction of the present variety, with resulting economy to everyone concerned. Such economy would in some cases be reflected in the first cost of the items, and even more obviously in the cost of carrying inventories, handling and distributing material, and actually applying the material in track or equipment.

This is one of the most important phases of the work of the Section of Purchases at the present time.—*American Machinist, April 25, 1934.*

Germans Have Advantage Over America in Russia

The Russians are bound to appreciate any effort on the part of American manufacturers to conform to their voluminous standards on parts and practices.

The Germans have a great advantage over us in this respect because many of the Russian standards are copied from the German DIN standards, while others are their first cousins. Emulating the thoroughness of the Germans, the Russians have attempted reduction to formula and standardization of practically everything under the sun, so that the conscientious designer spends fully half of his time poring into thick volumes of standards.

Of course, it is obvious that with the handicap of a different measurement system, American machines cannot conform to Russian standards in any appreciable way, but it is possible that machines built strictly for Russian export may incorporate some of the simpler Russian standards such, for instance, as preferred dimensions, which are linked with the gaging standards; or the Russian standard geometric ratios of 1.26 and 1.6; or in tool holders the Russian standard tool shank sizes.—*A. M. Wasbauer, American Machinist, Feb. 14, 1934.*

Diesel Digest Is Now Using ASA Standard Abbreviations

Diesel Digest, Los Angeles, has adopted American Tentative Standard Abbreviations for Scientific and Engineering Terms, in the interest of economy, simplicity, and readability.

The publication is printing those abbreviations and symbols of particular interest to Diesel engineers to acquaint them with the American Standard. The standard was published two years ago by the American Standards Association (Z10i-1932) and leadership in the work was taken by several engineering societies.

Consumer Research Meets Challenge of Customers[1]

By

H. A. Brown

Vice President and General Manager
General Motors of Canada, Ltd.

SINCE the time, a year and a half ago, when General Motors of Canada, Limited, mailed some 150,000 questionnaires to the motorists of Canada seeking to learn how they wanted their automobiles built, there have been many reactions in the minds of the public and of industrialists with similar problems. This "customer research" activity has apparently been viewed by some as a significant, if not radical, change of company policy or management point of view, but actually it involved no change of policy whatever and simply meant getting action in line with the same viewpoint that has been held for years.

What makes this customer research activity stand out is the fact that it reflects the management point of view better than any plan that preceded it, and so clearly is the viewpoint of management revealed that it becomes more interesting than before.

Customer research is, briefly, a management idea; not new, but applied with a new realization of its importance. Moreover, it is important also to those people within the organization who are engaged in fabricating that product as the customers want it. This double application of customer research may not be understood as fully as might be, and for that reason it may be interesting to outline the manner in which this plan may be applied to relations with the public as well as to relations with employees.

Big business, as it is known today, being only a recent development, is full of new problems. Certainly there is much to be learnt about the technique of big business management. If one were to go back and follow the progress of business institutions over the last 200 years, it would be found that there appeared to be a normal size beyond which they did not successfully grow.

Analyzing this further, one finds that this size was fixed by the ability of the manager to know personally what was going on in the business. When the business grew beyond this, inefficiencies crept in, the company began to lose money and, as the manager was in the most cases the owner, he either contracted the size of the business or it ceased to exist. The economies gained through mass production, however, have been more than such as to offset these normal inefficiencies and as a result, business has grown to its present dinosaurous proportions.

The last four years serve to test more severely the efficacy of everything that has been going on in big business management. This, in turn, is prompting the managers of these businesses to examine carefully their methods and policies and to make such corrections as are needed and are possible.

Insulated Management

One of the greatest difficulties which big business has to overcome is the insulation that is bound to exist between management and customers and between management and employees. Under predepression conditions sales were showing a month to month increase with resulting profits and increased wages. Because of this, it was easy to maintain a satisfactory morale in the organization. So it was only natural that management would not be sensitive to the fact that it was insulated from the public and from the thinking of the working man. With declining volume, declining profits, and the resulting inability to buy good organization morale, all management should have recognized the necessity of being more keenly sensitive to the reactions of the public and the reactions of employees.

It is interesting to note that in passing from a sellers' market to a buyers' market—as we have in the past three years—the manufacturer has been forced to scrutinize his products and the manner in which he merchandized them from the standpoint of the customer. On the contrary, during this same period, we have passed from a scarcity of labor to a surplus of labor which would normally have the opposite effect on man-

[1] Abstracted from *Canadian Business*, March, 1934.

Research stepped out of the laboratory door when General Motors of Canada, Ltd., undertook to study what its *customers* want.

Although it is inconceivable that a motor car could be built to the polyglot specifications of thousands of motorists, General Motors did discover many facts—and used some of them.

This abstract is published here because this type of customer research may play an important part in industry. Standards based upon a democratic and wide-range research of this sort cannot but be effective.

agement, and would cause the manufacturer to be less sensitive to the thinking of his employees. That a fundamental principle was involved in the dealing with both employees and customers was not generally recognized. It may possibly be that this attitude found in some managements is at the root of some of the labor situations which have developed.

General Motors of Canada, Limited, has been increasingly active in trying to inject this point of view into business operation and, as a result, various means of breaking down the insulation between the public and the employees have been developed. Consumer research is only one of these means.

But it is not enough to simply have the facts available. The real job, of course, is to use the facts in management. With the facts available, it would be a stupid manager indeed who did not sense the opportunities presented. To illustrate, the activity which Canadians commonly think of as customer research simply reflects an attitude on the part of the management which might better be phrased as "running the business from the customer's point of view." Now this does not mean in any sense that the interests of the stockholders are subordinate to the interests of the customer.

Personal Interest Pays

In the old days Robert McLaughlin built carriages with the full knowledge of exactly what his customers wanted. It was possible for him to be personally close to them. If they liked a particular kind of carriage he gave it to them and if they liked a particular kind of broadcloth for upholstery, he gave them that, but in doing so he did not sacrifice his profits, rather, he enhanced them.

Going back into the records, it is found that the present Canadian organization of General Motors was laid on a foundation of both serving the customer and making money for the owners. Thus, to run the business from the customers' viewpoint in no way conflicts with management's responsibility of running the business from the stockholders' point of view. In fact, business certainly would be breaking faith with the stockholders if it did not recognize the necessity of keeping faith with the customers.

New Customer Psychology

From the standpoint of industry the new psychology of today is most significant. A few years ago the public accepted without much question the products which industry offered; the public would pay the price placed upon these products; they accepted quite readily the statements about these products which appeared in the advertisements.

In short, everyone was rushing madly along, with plenty of money, usually buying the things which were most loudly called to their attention. Things are definitely different today—customers are becoming shrewd buyers; they question ballyhoo; they demand sincerity and above all, consumers appreciate some consideration being given to their needs and desires. Consumers, moreover, like to feel that they have had a part in the design of the products, and that their cries in the wilderness have had some effect upon the formulation of the policies of the companies that are serving them.

And so running the business from the customers' point of view is not only sound from the standpoint of good management but it is thoroughly in keeping with the changed public psychology.

Customer research is much talked of but it is not just used to arouse interest in our business—it is a very real, practical attempt to find out how to run the business from the customers' point of view. In prosecuting such a policy we are not to be confused with an eleemosynary institution. The reasons for doing it are orthodox in a business way.

If we give the customer more nearly what he wants we can make more sales, make them more

easily and less expensively. If we make more sales at a lower cost we can make more profit. Furthermore, a large group of satisfied customers is a good foundation for greater sales in the future. Of course many people predicted the same difficulties in connection with customer research. They pointed out that it would be impossible to design our products exactly as the customers wanted them.

Strangely enough we found that this was not nearly as difficult as we had supposed. There are, of course, certain things in the design of our products which, for engineering reasons, can't be changed. When we know that the public is not in sympathy with these features we have an opportunity to educate. It is our job to explain that because of certain engineering limitations, it is necessary to build the product the way it is built. So far we have found the public entirely reasonable in understanding and accepting such explanations once they are outlined to them.

Research Must be Continuous

Of course management is "on the spot." Unless management can justify its action with the public the door is wide open for criticism and management certainly is in for difficulty. This type of constant research, however, is a good check to have on management. It is sound from the stockholders' standpoint. Otherwise management could go along justifying an untenable position. But as conditions are, management cannot justify, over any period of time, a position that is untenable with the public.

Because General Motors of Canada, Limited, is dealing with a product which is so intimately part of a man's day-to-day life and because our operations are so diversified and so extensive geographically, it is necessary to devote an increasingly larger proportion of time to the establishment and successful application of this idea.

What we are really trying to do is to impress upon our entire organization the necessity of tuning up policies, products, and activities with the desires and needs of our customers and our employees and in turn to harmonize the thinking of those we serve with the problems of breaking through the inherent insulation that exists, and of developing, to the extent possible in a big organization, that high degree of understanding that is inherent in a little company, but is so necessary in the successful conduct of business in this day when the customer is awakening to the fact that he, after all, is the person to be pleased.

Household Clinic Offers Booklets

The Sears Institute of Household Science is issuing a series of booklets as purchase guides for household buyers. They give general information on quality, and the service to be expected from different types of materials and construction used in the products discussed.

Three pamphlets of the series on bedding equipment have been received by the ASA office. These are on wool and part-wool blankets, mattresses, and bed pillows. The pamphlet on bed pillows, for example, gives information on different types of fillings used, weight of the standard size pillow, ticking, and tests to be used when purchasing pillows.

The purposes of the Clinic as listed in its brochure are:

To further the return to standards of quality;
To teach the relation between value and cost;
To promote intelligent buying.

The Clinic does not promote brand merchandise, and does not recommend where or what to buy.

Further information concerning pamphlets available from the Clinic can be obtained from the Sears Clinic of Household Science, 7 East Van Buren Street, Chicago, Illinois.

Lauds American Pole Standards

A paper on the preservative treatment and line service of creosoted poles was presented at the 30th Annual Meeting of the American Wood Preservers' Association, Houston, Texas, by R. E. Meyers, International Creosoting and Construction Company.

He said that the general acceptance of the pole specifications of the American Standards Association has placed pole selection and size choice on a better engineering basis.

He also discussed the widespread use of creosoted pine poles for distribution lines in cities and brought out the insulating value of wood for high voltage transmission lines, stating that 110 kv and 132 kv transmission lines are economically supported on creosoted wood pole structures.

Walter Wood

Walter Wood, president of R. D. Wood & Company, and the Florence Pipe Foundry and Machine Company, Philadelphia, died on April 20.

For many years he had been active in standards work of the pipe industry and of the American Standards Association. He served on several ASA sectional committees.

Revision of Fire Tests of Building Materials Is Approved by Committee

As sponsors for the project on Fire Tests of Building Construction and Materials, the National Bureau of Standards, Fire Protection Group, and the American Society for Testing Materials, have concurred with the recommendations of the sectional committee concerning the approval of certain revisions of the document, approved in 1926 as American Tentative Standard, and the advancement of the revised document to American Standard.

The revised document, submitted to the ASA in June, includes changes in the text that have been under consideration in the sectional committee and in A.S.T.M. Committee C-5 on Fire Tests on Materials and Construction for some time. Although the sectional committee has recognized that frequent revisions would be unwise because of their effect on the status of building classifications derived from tests conducted in accordance with the tentative standard approved in 1926, deliberations by the sponsor bodies and committees interested in fire tests indicated the desirability of certain changes in the document.

In June, 1933, A.S.T.M. Committee C-5 recommended revisions in several sections of the tentative standard (A.S.T.M. C 19-26 T) and further recommended that the revised document be approved by the Society as an A.S.T.M. standard.

These recommendations were accepted by the Society in June, 1933, and the document was subsequently approved by a letter ballot of the Society as C 19-33. The recommendations of A.S.T.M. Committee C-5 were also considered by the sectional committee.

After a letter ballot the sectional committee, in November, 1933, recommended to the sponsors that the revised standard be submitted to the ASA for approval as American Standard.

R. L. Templin Wins A.S.T.M. Dudley Medal

R. L. Templin, Chief Engineer of Tests, Aluminum Company of America, was awarded the Charles B. Dudley Medal for 1934, awarded annually by the American Society for Testing Materials to the author of the paper presented at the preceding annual meeting which is of outstanding merit and constitutes an original contribution to research in engineering materials. Mr. Templin's paper was on "The Fatigue Properties of Light Metals and Alloys." He described a new type of direct tension-comparison fatigue machine and gave important fatigue data on many commercial light alloys.

The medal was presented at the A.S.T.M. annual meeting in Atlantic City, June 25-29.

Mr. Templin was Research Fellow in the Engineering Experiment Station, University of Illinois. Later he became engineering physicist at the National Bureau of Standards. Since 1919 he has been with the Aluminum Company.

Specifications for Construction Steels Under Way in Canada

The Canadian Engineering Standards Association's Joint Panel of Structural Steel has decided to publish specifications for steel construction materials. These will be inserted in different structural specifications.

The material specifications will cover medium and mild structural steel, structural silicon steel, structural rivet steel, cast steel, and cast iron. Specifications for medium and mild steel will be based upon the latest tentative A.S.T.M. specifications.

At a later meeting, it was decided that acid Bessemer steel should not be included in the proposed specifications.

Simplified Practice on Taper Roller Bearings

Printed copies of the revised Simplified Practice Recommendation R67-33 on taper roller bearings are now available, according to an announcement of the Division of Simplified Practice of the National Bureau of Standards. They can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from the ASA office, for five cents each.

The current revision of this Simplified Practice Recommendation, originally formulated by the industry in 1927, brings the program into accord with the Society of Automotive Engineers' revised standard and extends the scope of the original recommendation to include larger bearings and also certain steep angle bearings for naval and general use.

Health Experts Will Advise Exhaust System Code Group

A SAFETY code project of the American Standards Association will be based upon considerations of health, when a subcommittee of health experts will be appointed to advise the Committee of the Safety Code for Exhaust Systems.[1]

Blocked in their attempt to write an adequate code for exhaust systems for factories until danger limits of the amount of dust or fumes in air breathed by workers is definitely established, the committee approved a subcommittee's recommendation to name an advisory board of toxicologists, physiologists, and other medical and health experts.

These resolutions were adopted by the committee and it was voted that the committee request the Safety Code Correlating Committee to:

(*a*). Approve changes in the scope of the work of the Exhaust Code Committee to read: "Standards for the design and maintenance of equipment to provide a safe atmosphere by removing harmful substances from their point of production or issuance and by safely disposing of such substances." Permission for this change must be had from the Safety Code Correlating Committee.

(*b*). Recommend that the Safety Code Correlating Committee consider asking the American Standards Association to appoint a National Advisory Committee of clinical, pathological, and other experts, who could render advice on toxic and hazardous limits of materials, to various sectional committees developing health standards under ASA procedure.

When the sectional committee adopted the subcommittee's recommendation that the scope of the work be changed to consider the basic health considerations of the problem of exhaust systems for factories, foundries, mills, quarries, etc., it was agreed that fundamental research must be done to determine the dividing lines between permissible and harmful amounts of dust and toxic fumes in the air.

[1] Sectional Committee of the Safety Code for Exhaust Systems (Z9).

Although a number of American Standard safety codes give some consideration to health of employees, most of the work has been based upon consideration of bodily injury and death of workers.

The wide field of toxicology—a branch of medical science which has not been investigated as thoroughly as many other subjects—is thus brought into the work of safety codes for the first time.

Research Is Recommended

Some literature has been published about toxic studies in several hazardous occupations, and the committee believes this should be gathered and presented in usable form. But a coordinated research should be initiated to go further into the whole subject of occupational diseases, the committee decided.

Millions of dollars are involved in personal injury suits, and employers are at a marked disadvantage in defending these actions because of the paucity of scientific data on the subject.

State health inspectors are equally at a loss to know when workers are being subjected to health hazards until they are supplied with dangerous limits, or threshold limits, of dust and poisonous fumes.

The proposed code for exhaust systems, it was pointed out, cannot be a guide for the installation of fume and dust removing equipment until these danger limits are established. The wide diversity of opinion of consulting experts is the result of no unified study of the subject in relation to the health of workers in all hazardous occupations. However, the proposed committee of toxicologists will have available considerable research work already done in several occupations where fumes and dust have caused trouble.

Will Name Advisory Committee

The Exhaust Code committee plans to name its own toxicological advisory committee, whether the Safety Code Correlating Committee decides to recommend the appointment of a national consulting committee of this nature or not.

Because health hazards are assuming such im-

portance in industry, the committee decided to authorize John Roach, chairman, to appoint subcommittees to work on safety codes for

(*a*). Abrasive cleaning,
(*b*). Chromium plating,
(*c*). Granite cutting,
(*d*). Rock drilling,
(*e*). Spray coating.

The number of health standards to be developed, however, will not be limited to these topics, the committee agreed. A subcommittee on Fundamental Principles of Design and Operation and Maintenance of Exhaust Systems will be appointed.

Because of the fundamental nature of the research work which will be involved in the work of the committee, it was voted that a special committee be appointed to study questions relating to financial support for research of an engineering nature.

Drawing and Drafting Practice Is Proposed

A proposal for an American Standard on Drawings and Drafting Room Practice has been issued as a tentative draft for criticism and comment. Copies may be borrowed by Company Members from the American Standards Association.

Graphical symbols and drawing practices devised by most of the larger drafting rooms for their own use have been developed in considerable variety. As the "language of industry," drawing practice and symbols need a recognized and authoritative manual or dictionary which will establish standard practice and make it possible for all drawings to be read and written easily and accurately. The proposed standard would serve as a dictionary of drawing.

Sizes of drawings, arrangement of views, line work, dimensioning, and lettering are covered in the present draft. A standard for graphical symbols will soon be presented for approval.

The organizations sponsoring the project are the Society for the Promotion of Engineering Education and the American Society of Mechanical Engineers.

John Bath & Co. Is ASA Member

John Bath and Company, Inc., Worcester, Mass., has become a Company Member of the American Standards Association.

The company manufactures ground taps, internal micrometers, thread gages, and thread rolling dies.

Seek Pathological Data In Writing Exhaust Code

The Sectional Committee of the Safety Code for Exhaust Systems, which met recently in New York, believes that its work can be successful only if an Advisory Committee of health experts can be called upon to supply basic toxicological and physiological data.

Members of the committee follow:

John Roach, International Association of Governmental Labor Officials, *Chairman.*

Cyril Ainsworth, American Standards Association, *Secretary.*

American Foundrymen's Association, *T. W. Pangborn, James R. Allan, (alt.).*
American Public Health Association, Industrial Hygiene Section, *Dr. Henry Field Smyth.*
American Society of Heating and Ventilating Engineers, *Wm. M. Wallace II.*
American Society of Mechanical Engineers, *J. C. Hardigg, E. H. deConingh, (alt.).*
Association of Manufacturers of Woodworking Machinery, *F. G. Walker.*
Foundry Equipment Manufacturers Association, *S. C. Vessy, V. E. Minich (alt.).*
International Association of Governmental Labor Officials, *John Roach.*
Manufacturing Chemists Association, *H. L. Miner.*
National Association of Mutual Casualty Companies, *S. E. Whiting.*
National Association of Fan Manufacturers, *W. Gardner, W. F. Wrightson.*
National Bureau of Casualty and Surety Underwriters, *R. C. Stratton, W. M. Graff (alt.).*
National Electrical Manufacturers Association, *R. C. Allen, G. E. Sanford (alt.).*
National Founders Association, *T. W. Pangborn.*
National Safety Council, *J. C. Wilson, J. E. Culliney (alt.).*
U. S. Department of Agriculture, Bureau of Chemistry and Soils, *Hylton Brown, Roy L. Hunt (alt.).*
U. S. Department of Commerce, Bureau of Mines, *W. P. Yant, Dan Harrington (alt.).*
U. S. Department of Labor, *Roy Kelsey.*
U. S. Department of Labor, Bureau of Labor Statistics, *Swen Kjaer.*
U. S. Treasury Department, Bureau of the Public Health Service, *J. J. Bloomfield, J. M. Dalle Volle (alt.).*
Members-at-Large, *L. A. DeBlois, Prof. Philip Drinker, Dr. Leonard Greenburg, Dr. William J. McConnell.*

The International Association of Industrial Accident Boards and Commissions has assumed leadership in this work.

Petroleum Industry Is Making Huge Savings by Standardization

MORE than $14,000,000 a year is saved by the petroleum industry through its standardization programs, according to an estimate made by W. R. Boyd, Jr., Executive Vice President of the American Petroleum Institute.

In a paper presented at the recent Fourth Mid-Year Meeting of the Institute, Mr. Boyd pointed out that a Central Committee on Standardization of Oil-Field Equipment is composed of the national chairmen of the 10 topical standards committees. This Central Committee has general supervision of all standardization work in the production division affecting oil-field material, and it approves, at its discretion, all new specifications adopted by the various topical committees as well as revisions or additions affecting existing specifications.

Five hundred and eighty-one experts serve on the topical committees on Belting, Boilers, Cable Tools, Rigs and Derricks, Tubular Goods, Rig Irons, Rotary Equipment, Rope, Pumping Equipment, and Steel Tanks for Oil Storage.

The materials and equipment used by the producing branch of the industry are so numerous, and vary so widely, that it was necessary to appoint 10 topical committees on standardization, to each of which was assigned the problem of formulating specifications in its own field.

Represent Varied Interests

The structures, functions, and methods of procedure of these 10 committees are substantially identical. Each committee consists of users (grouped in five regional subcommittees) each having its own district chairman. Each committee has a special subcommittee of manufacturers and usually, in addition, a special subcommittee of engineers or other special functional groups.

Each topical committee has prepared a specification or specifications, and in addition in most cases has prepared a code of recommended practice on the care and use in the field of the material covered by its specifications. In many cases the information in the codes has been condensed on posters for the convenience of field workers.

In order to provide adequate uniformity in gages and gaging practice for the different kinds of threaded products, a Correlating Committee on Gages and Gaging Practice has been appointed—composed of representatives from the topical committees affected, and including in its membership representatives from the National Bureau of Standards. This committee passes upon all matters affecting gages.

Benefits to the Industry

The advantages of these specifications in the industry are:

1. They enable the purchaser and manufacturer to speak the same language.
2. They provide, when necessary, minimum or maximum requirements on physical and chemical properties to insure a definite grade or quality of material suitable for specific purposes in producing oil.
3. When necessary, they provide for in-

Petroleum Industry Now Gets Benefits of National Forum

In order to gain benefits of national standards, the American Petroleum Institute recently joined the American Standards Association as a Member Body.

The industry may now submit its own standards to the ASA with the view of having them become American Standards. In this process, widely representative committees of experts in other fields will be appointed to consider proposals from an inter-industry viewpoint.

This clearing-house method has been responsible for the success of several hundred American Standards and Safety Codes. Through the ASA membership in the International Standards Association, the work assumes a world-wide scope.

The outstanding phases of the petroleum industry's standards activities are given in this article.

terchangeability between manufacturers, by means of the standardization of basic dimensions and threads. Practically every important threaded connection used in the producing branch has been standardized. Thread troubles on tubular goods, formerly a major cause of complaint and expense to both manufacturer and operator, have practically disappeared. Over one million dollars has been expended for master and working gages for threads on tubular goods, taper joints for drilling tools, sucker rods, etc.

4. They eliminate the necessity of individual companies formulating their own specifications.

5. The committee procedure provides for representation from the ultimate consumer, the manufacturer, and specialists such as gage manufacturers, testing agencies, etc., thus insuring practicability of specifications.

The Institute has adopted an official monogram (registered with the U. S. Patent Office) the use of which is licensed to manufacturers. This monogram, affixed to the product, is a guarantee to the purchaser that material so marked complies with the Institute's specifications. Each specification authorizing its use contains definite instructions as to the size and manner of application of the monogram, thereby providing convenient identification of materials by the purchaser.

Three hundred and eighty-two manufacturers have been licensed to use this monogram, distributed as follows:

United States	290	France	9
England	26	Scotland	3
Canada	5	Belgium	2
Russia	1	Czechoslovakia	11
Netherlands	2	Hungary	2
Austria	1	Poland	2
Germany	25	Italy	2
		Roumania	1

Material manufactured to A.P.I. specifications is available in the principal manufacturing countries of Europe and North America. This enables companies operating abroad to follow the same standards in their foreign operations as are used in the United States.

Maintaining Standards

A Correlating Committee on Gages and Gaging Practice, composed of nine members, serves to help maintain dimensional standards.

1. A complete system of gage control has been set up, administered by the Institute's production division office at Dallas, to insure periodic testing of gages owned by various licenses, to the end that these gages are maintained within certain limits.

$14,000,000 Savings Accrue Through Industry's Standards

In the following statement covering each topical committee activity, an attempt has been made to estimate the monetary saving to the industry. These figures are necessarily only estimates, as no statistics are kept on the quantities of materials used or the percentage made to A.P.I. specifications.

Following is a summary of the estimated yearly saving on the principal items of equipment used in producing operations:

Estimated Savings to Industry	
Belting	$500,000
Boilers (no data)	
Cable tools	500,000
Rigs and derricks	1,000,000
Tubular goods	8,500,000
Rig irons	75,000
Rotary equipment	1,000,000
Wire rope and cordage	900,000
Pumping equipment	1,000,000
Steel tanks for oil storage	650,000
Total	$14,125,000

2. The topical committees are maintained as standing committees, so that they may revise and amend the specifications when necessary or desirable to keep them abreast of developments.

3. A complete follow-up record of all handbook owners is maintained, and revisions are mailed to each subscriber as and when issued. There are at present 2,479 subscribers to this follow-up service.

4. Sales of specifications and codes to the industry since 1926 have amounted to approximately $100,000.

Of the many functions of the Institute, accident prevention constitutes an important part of its service to the petroleum industry.

This work began in 1927 as a committee activity, and in 1931 the A.P.I. Department of Accident Prevention was formed. Estimated savings to the industry as a result of this work are put at more than $12,000,000 by Mr. Boyd.

The frequency of disabling injuries in the petroleum industry has declined 58 per cent since 1927. Although the frequency of injuries in the petroleum industry increased 5.9 per cent during 1933, reports from the National Safety Council indicate that all industries combined have had a 10 per cent increase in the frequency of injuries during 1933. Compared with the accident experience of all industries, the accident frequency of

the petroleum industry for 1933 is more than 10 per cent better than that of all industries. In 1927 the frequency of accidents in the petroleum industry was 18 per cent worse than the average for all industry.

Had the frequency rate of 1927 prevailed among the reporting companies, 41,910 more injuries would have occurred than were reported. As the cost of disabling injuries in the petroleum industry averages approximately $300, the prevention of these 41,910 injuries reflects a saving of $12,573,000 in compensation, hospital, and medical costs. This figure does not take into consideration savings effected by the prevention of accidents which would have caused fires or damage to equipment, or injuries which would have caused no loss of time from the job.

Standing committees are appointed each year in each of the three divisions of the Institute. These committees usually meet twice each year to review and recommend material for publication and guide and assist the secretary of the committees in the work of the department.

The committees of the three divisions—production, refining, and marketing—function separately on specific problems pertaining to their respective departments, such as the development of manuals. However, so many of the committee members are interested in the activities of all departments that the members of the three committees are kept informed on all projects, and practically serve as a joint committee on the activities of the department.

A.P.I. Accident-Prevention Manuals: One of the major activities of the committees is the development of manuals covering the handling of certain work in the various departments so as to prevent accidents. Preliminary drafts of the manuals are circulated to committee members, who in turn obtain advice from operating supervisors and submit their comments to the secretary. The drafts are edited and re-edited until they are acceptable to the committee members, and are then passed on to the general committees of the respective divisions for approval for publication.

About 40,000 copies of these manuals have been distributed. Some companies that are not using the manuals are taking advantage of the material and developing their own codes or manuals for the more intimate contact with employees.

Safety Codes: The director is a member of the American Standards Association Safety Code Correlating Committee, and through this contact he is able to keep committee members informed on proposed codes and their application to the petroleum industry. In this way, safety engineers may work constructively with other industries.

The Institute recently became a Member-Body of the ASA.

Agreement Reached On Standards for Burners

The Commercial Standard for Domestic Burners for Pennsylvania Anthracite, CS 48-34, has been accepted by a sufficient number of manufacturers and users to warrant its promulgation, the National Bureau of Standards recently announced. The effective date for new production of fuel-burning equipment covered by this standard is August 1, 1934.

The standard, which covers underfeed-type burners (stokers) using Pennsylvania anthracite as a fuel, with a capacity not exceeding 50 pounds of coal per hour, gives detailed requirements for the construction, installation, and operation of such equipment. Among the construction requirements are the capacity and materials to be used in the coal hopper and in the ash removal and coal conveying systems. Sections covering the rating of such burners, allowable limits for safe working conditions for steam and hot water heating systems, efficiency of the burner unit, and the electrical consumption for operating the burner unit are included.

These stokers are primarily intended for heating installations in residences, small apartment houses, etc. The research from which the standard has been developed has been under way for several years in the laboratory of the Anthracite Institute in order to provide reliable and economical automatic or semi-automatic equipment for householders using anthracite coal. With this work manufacturers of stokers have been cooperating.

Carrier Corporation Becomes ASA Member

The Carrier Corporation, Newark, N. J., has joined the American Standards Association.

The company manufactures air-conditioning equipment, refrigerating systems, and ventilating equipment, and has plants in Newark, New Brunswick, N. J.; Bridgeport, Allentown, Pa., and Chicago, as well as in England, Germany, Australia, and Japan.

Publishes Specifications And Tests for Containers

Recommendations for Specifications and Testing Corrugated Fiberboard Shipping Containers have been published in pamphlet form by the National Association of Purchasing Agents, New York. This is the first publication of this kind, and is being welcomed by container manufacturers and purchasing agents.

To Enforce New Window Cleaning Regulations In Attempt to Decrease New York Fatalities

In a determined effort to lessen the number of fatal falls of window cleaners and the incidental danger to pedestrians, Industrial Commissioner Elmer F. Andrews, New York, announced that owners, lessees, superintendents of buildings, window cleaning contractors and window cleaners would be prosecuted in court actions for failure to comply with the sections of the Labor Law requiring the furnishing and constant use of sash anchors and safety belts whenever a window is cleaned from the outside. (This and other safety measures are provided for in the American Standard Code.[1])

Commissioner Andrews has sent a letter to real estate associations notifying them of the drive to cut down accidents to window cleaners which increased in 1933 and have already resulted in five deaths this year, imperiling many pedestrians. In the letter he asked for the cooperation of owners, lessees, agents, managers and superintendents to see to it that no window cleaner goes outside a window without first hooking the safety belt to anchors which, under the law, must be attached to all windows which are to be cleaned from the outside.

"An amendment to the Labor Law which was enacted at the last session of the legislature, and which became effective April 5 as Chapter 139 of the Laws of 1934, closes the last loop-hole in the law designed to insure the safety of window cleaners," said Commissioner Andrews. "This amendment provides that, supplementing the previously existing law requiring owners, lessees, or managers of buildings to furnish safety equipment, the contractor is now required to see to it that this equipment is provided and used.

Owners are Responsible

"Owners of property carry the greatest responsibility in window cleaning accidents. When we have proper cooperation on the part of owners, lessees, agents, managers, and superintendents in charge of buildings, and by window cleaning contractors, there will be fewer casualties and fewer owner-liabilities. Many times falling window cleaners injure pedestrians. There is always the possibility of a third party action on the part of those injured, or in behalf of an injured window cleaner, when the equipment is not in full compliance with the law or the rules of the Industrial Board.

"It is true that many window cleaners fail to use the equipment furnished for their protection. If those in charge of the property will give attention to the methods used by window cleaners when in their buildings and see to it that they use properly the equipment provided and, in the event that the cleaners do not, require them to do so or leave the building, it will not be long before there will be better observance of the law."

Ask Tenants to Report Negligence

Commissioner Andrews recommended that elevator operators report to building superintendents when window cleaners visit buildings to work in any part thereof. Tenants should be asked to notify building superintendents whenever a window cleaner fails to use the safety equipment.

"These suggestions are supplemental to the legal responsibility laid upon owners, contractors, and cleaners to observe the law and do not relieve them from strict compliance.

"Because of increasing number of fatalities, the policy of the Department will be to insist on full compliance relative to installation of equipment and the proper use thereof. In each instance where we find windows being cleaned in violation of the law or the rules of the Industrial Board supplemental thereto, the owner, lessee, agent, manager, or superintendent in charge of the building will be required to appear in court for failure to assume the responsibility provided by the law.

This will also apply to the window cleaning contractor and to the man cleaning the windows who fails to use the safety equipment when it is provided in compliance with the law and rules."—*Real Estate Magazine, June, 1934.*

[1] Industrial Standardization, May, 1934.

Motorists in India Want Standardized Road Signs

Motorists' desire for standardized road signs throughout India has come nearer gratification. The Government has circularized to state administrations a series of designs, which they recommend for adoption.

If the designs are accepted, motorists from one part of the country will no longer have to complain that they cannot understand road signs in another.

New York State Soon to Complete Uniform Building Code, Says Keogh

A UNIFORM statewide building code, long advocated by the Department of Labor and the New York State Conference of Mayors, will be available in about one year. This was the announcement of George P. Keogh, industrial code referee, during an address before the 25th annual conference of mayors at Jamestown June 14.

The new uniform building code, when completed under the sponsorship of the Department of Labor, will embrace the best modern practices of building construction from the standpoint of safety, economy, and utility, according to the code referee. Its adoption by municipalities will lessen building costs, reduce fire hazards, and stimulate building and construction activities consistent with the purposes of the NRA and the President's housing program.

Federal funds to investigate existing building codes in New York State as a basis for a standardized code were obtained early this year by Deputy Industrial Commissioner William J. Picard, of the Department of Labor. The faculties of the College of Architecture and the College of Engineering of New York University collaborated in this survey with the Conference of Mayors and other municipal officers of the State of New York.

Referee Keogh said that it was the lack of uniformity in basic requirements that prompted the Department of Labor to make a comparative analytical study of the various building codes before recommending a unified minimum standard code. He pointed out that in a group of 40 representative cities and townships, some with no geological or geographical differences worth mentioning, there were variations as high as 100 per cent in building requirements.

Wide Variance in Floor Stresses

Despite the fact that the physical qualities of steel, concrete, and wood are definitely universal, it was found, for instance, that floor load requirements varied from 75 pounds per square foot for a public building in one city to 150 pounds per square foot for a similar building in a city a short distance away. This difference in floor loading obviously has a direct reaction on the cost of construction.

In the analytical study it was clearly shown that many codes are obsolete in whole or in part, due to the lack of progressive revision consistent with advance and development in building design and construction.

In many communities codes are promulgated by local committees and legislative bodies on which too frequently there is an absence in representation of architects and engineers, resulting in the continuance of ambiguous, indefinite, unwarranted specifications and requirements handed down from generation to generation, Mr. Keogh pointed out.

He stated that the primary purpose of a building code is to promote public health and safety.

The uniform building code, when completed, will be available to municipalities either for adoption or as reference for a study of existing codes, at a minimum cost probably not to exceed that of printing.

The new code before its final adoption will be presented to recognized authorities in building and construction design such as the National Bureau of Standards, the American Society for Testing Materials, the American Institute of Steel Construction, the American Society of Heating and Ventilating Engineers, the American Standards Association, the American Concrete Institute, the Building Officials Conference, and other safety and technical organizations to insure smaller construction costs, reduced fire premiums, and increased building construction.

Ancient Lighting Required In Modern Building Code

In one of the larger cities of the state, in a code which has been adopted within the last five years, is still found the following inherited provision: "a tallow candle or a sperm oil lamp supported by a metal bracket should be kept burning during performances for emergency exit lighting purposes."

In another local ordinance "the planting of poison ivy and ragweed is prohibited."

Government Issues New Specifications

The following federal specifications which became mandatory upon government departments for government purchases since December 1, 1933, have been received by the American Standards Association Library. They are on sale by the Superintendent of Documents, Washington, D. C., at five cents each except where another price is given, or may be purchased or borrowed from the ASA office. The symbols given all refer to Section IV (Part 5) of the Federal Standard Stock Catalog.

Acetone O-A-51a.
Aluminum-Alloy (Aluminum-Copper-Magnesium-Manganese); Bars, Rods, Shapes, and Wire QQ-A-351.
Aluminum-Alloy (Aluminum-Manganese); Bars, Rods, Shapes, and Wire QQ-A-356.
Aluminum-Alloy (Aluminum-Copper-Magnesium-Manganese); Plates and Sheets QQ-A-353.
Asphalt; Cut-Back for Road-Work SS-A-671.
Asphalt; for Built-Up Roofing, Waterproofing, and Damp-Proofing SS-A-666.
Asphalt-Primer; for Roofing and Waterproofing SS-A-701.
Blankets; Cotton, and Cotton-Warp and Wool-Filling DDD-B-421a.
Bleaching-Material (Chlorinating Agents) O-B-441.
Brass, Naval; Bars, Plates, Rods, Shapes, Sheets, and Strips QQ-B-636.
Brick; Sewer, Clay SS-B-691.
Carpets and Rugs; Axminster DDD-C-51.
Catheters; Urethral, Plain, Soft-Rubber ZZ-C-101.
Cement; Bituminous, Plastic SS-C-153.
Cement; Silica HH-C-176.
Chain; Ship RR-C-251.
Charcoal LLL-C-251.
Clock-Systems; Electric W-C-471.
Copper-Nickel Alloy; Bars, Plates, Rods, Shapes, Sheets, Strips, Tubing (Seamless), and Wire QQ-C-541.
Copper-Silicon-Alloy; Bars, Plates, Rods, Shapes, Sheets, and Strips QQ-C-591.
Coppers; Soldering GGG-C-571.
Cotton-Fabric; Woven, Asphalt-Saturated HH-C-581.
Couplings; Hose, Cotton, Rubber-Lined, and Linen, Unlined WW-C-621.
Couplings; Hose, Garden and Water WW-C-623a.
Couplings; Hose, Oil-Suction and Discharge WW-C-626.
Drills; Breast GGG-D-651.
Duck; Cotton, Plied-Yarns (Army, Numbered and Tent-Duck) CCC-D-771a.
Extractors; Cotter-Pin GGG-E-926.
Felt; Asphalt-Saturated, for Flashings, Roofing, and Waterproofing HH-F-191.
Gratings; Steel (Flooring, Landings, Steps, Etc.), Shore and Marine Use (Except for Naval Vessels) RR-G-661.
Handles; Hickory, for Small-Tools NN-H-96.
Handles; Wood, Miscellaneous for Tools NN-H-106.
Hardware, Builders'; Door-Closers FF-H-121.
Hardware, Builders'; Hinges FF-H-116.
Hardware, Builders'; Locks and Lock-Trim FF-H-106.
Hardware, Builders'; Shelf, and Miscellaneous FF-H-111.
Hose; Fire, Linen, Unlined JJ-H-571.
Hose; Pneumatic, Wrapped ZZ-H-499.
Kerosene VV-K-211.
Ladders; Step LLL-L-61.

American Standards Association Reaches Peak in Its Membership

Despite the depression, the American Standards Association has reached an all-time peak in membership, with 42 Member-Bodies and Associate Members and 1233 Company Members.

Since January, nine associations have become Member-Bodies or Associate Members.

Food Labeling In England

An editorial in *Food Manufacture* (London), May, on labeling food, says:

"A Departmental Committee in this country has drafted its report, and new legislation upon food qualities and food contents will probably be recommended. The object of the committee was to consider 'whether it is desirable that the law relating to the composition and descriptions of articles of food should be altered so as to enable definitions or standards to be prescribed, and, if so, to recommend what alterations of the law are required'.

"According to a *Times* correspondent, the report, which is unanimous, advises that Parliament shall empower the Minister of Health to make orders as to the contents and labeling of particular foods upon the findings of an advisory committee which shall go into full consultation with the interests affected and shall hear evidence. . . .

"At present there are very few articles of food the sale of which is controlled by standard. The dairy products—milk, cream, butter, and margarine—appear to be the only ones, and there are undoubtedly many others, such as bread, jam, meat paste, egg powder, and custard powder, to mention but a few, that might come under definite control. . . ."

Report Standards Work On Periodical Data

The standards project on Reference Data for Periodicals was reported at the annual convention of the Special Libraries Association, June 19-22, when more than 250 librarians representing industrial, scientific, and special libraries in all fields, assembled in New York.

The association recently became an Associate Member of the American Standards Association.

Federal Commission Finds Standards Essential in Trade Price Reporting

Among the most valuable kinds of association work, the Federal Trade Commission believes, are standardization, simplification, and grading and labeling. These, according to the report quoted in part here, are in the nature of group activities. Rapid growth of these developments are reported.

IN A lengthy report on open price trade associations, the Federal Trade Commission discussed the part standards play in this and other management problems of industry.

Excerpts from the Commission's report dealing with standards from the manufacturers' point of view follow:

Irrespective of the price-reporting activity of associations, the need of established and definite grades in certain lines has long been felt and the need has been in part met by official standards protected by official grading and inspection.

The grading of grain is one of the oldest and most important examples. The grading and inspection of lumber is almost equally important. In the case of grain, there are public exchanges at which prices are reported daily, hence there is no need of an association price-reporting service. Not only do lumber associations frequently report prices, but they also undertake inspection work to simplify the process of buying and selling, and to insure to the purchaser that he will get what he buys without being under the necessity of inspecting the commodity before buying.

Hampered by Lack of Standards

Many associations that would like to develop price-information work find it impossible to do so satisfactorily as yet because of the absence of standardization and of the establishment of definite grades for their products. Others that have actually undertaken price-reporting work find the results unsatisfactory and have sometimes abandoned it for the reason that the grades are not well enough defined so that a price can have definite significance apart from specific knowledge of the particular article sold.

As one secretary expresses it, there can be no object in the exchange of price information until you have definitely determined grades. In several instances (fresh-water pearl buttons, gelatin, etc.) it has been stated that price reporting was abandoned because of a lack of standards. Without definite standards, the attempt to establish a market price may mean merely giving to some manufacturers a better opportunity to get business at less than that price, which they make profitable by cutting the quality. Some manufacturers, it is said, like to have a current price established as a basis for underbidding. On the other hand, there are some manufacturers who will not sell as low as the current general price, and who pride themselves on building up a reputation for quality which will enable them to obtain business regularly at something over the general average price.

Standards Would Protect Quality

The establishment of accepted standards would work in the direction of uniformity with respect to effects on both these classes of producers. It would be especially effective, however, against those who wish to cut quality.

Sometimes the lack of established grades impairs the significance of compiled prices. Trade statistics may also be affected, as is the case where material that is of questionable value is given equal weight, in compiling stocks, for example, with that for which there is a ready demand.

Some of the most valuable kinds of association work may be classed as measures looking to greater economy and efficiency in business. Among these are standardization, simplification, and grading and inspection. Government participation figures largely in all these matters, but not without the help of voluntary associations of business men, and in perhaps the majority of cases the initiative has been taken by the latter.

At present, it is true, the Department of Commerce leads the way in standardization and simplification, though relying extensively on trade-association cooperation. At present, also, grading systems for natural products have largely become

matters of law administered by the Department of Agriculture, but the grading of grain—probably the most important group—did not begin that way.

Standardization and simplification work and grading and inspection services are in the nature of group activities. In so far as they do not become Government work they are administered and directed by trade organizations including private bureaus. Even where governmental agencies are active, trade associations are usually an essential factor in the success achieved. While not all industries are involved in such activities, there has been a steady growth, and in the past few years a rapid growth, especially in standardization and simplification.

As for grading and inspection service—exclusive of agricultural and livestock products—such industries as have uniform grades and inspection conduct these activities, as a general rule, through their trade associations. As regards many farm products and foodstuffs, grades have been established by law and inspection is more or less official.

Numerous standardizing agencies and the hundreds of completed projects attest the fact that standardization and related developments are now an active and universal principle touching innumerable details of industrial activity.

The establishment of minimum standards of tolerance as regards dimensions, quality, and performance; the development of uniform specifications as bases for purchasing by Federal, State, city, and other buying agencies; the arrangement of testing methods and agencies for the determination of compliance with standards and specifications; and the elimination of unnecessary sizes and varieties—these are activities which have developed and are being further expanded with such rapidity as to constitute a unique feature of present industrial progress.

Types of Standards

Standardization in production, distribution, and business administration includes:

1. Nomenclature, such as definitions of technical terms used in specifications and contracts, also technical abbreviations and symbols.
2. Uniformity in dimensions necessary to secure interchangeability of parts and supplies, and the interworking of apparatus.
3. Quality specifications for materials and equipment relating to composition, form, and structure.
4. Methods of tests to determine standards of quality and performance.
5. Ratings of machinery and apparatus under specific conditions.
6. Safety provisions and rules for the operation of apparatus and machinery in industrial establishments, safety codes, and standards of practice.

The World Economic Conference at Geneva in May, 1927, recommended that producers should "carry on systematically on an international as well as a national basis the standardization of materials, parts, and products of all types which are of international importance, in order to remove the obstacles to production and trade which might arise from a purely national policy of standardization."

Progress in International Standards

There are now national standardization bodies in at least 20 foreign countries. Considerable progress is being made in the direction of establishing certain international standards. Three general conferences have been held: London, 1921; Zurich, 1923; and New York City, 1926. Since 1921 there have been systematic exchanges of information on work in progress, and most of the national bodies have been acting as sales agents for publications concerning the standards of the other bodies. Considerable uniformity between standards of groups of countries, chiefly on the European Continent, has been brought about in a number of commodities.

The Secretary of Commerce, whose department is particularly concerned with national standardization and simplification, has stated that:

> These efforts are profoundly in the public interest. For every dollar by which we decrease the cost of production and distribution, by just that much do we add to the total goods and services for the Nation, and thus to our standard of living. It is in the interest of the manufacturer for it decreases cost of production, it encourages the manufacture of stocks and thus increases regularity of employment. It is to the advantage of the distributor because it decreases volume of variety and total stocks which he must carry and thus decreases his risks. It is to the advantage of the consumer because competition will carry some part of the savings to him. And above all it places the smaller manufacturer more nearly upon an equality with the larger in these particulars and thus tends to maintain the smaller units in sound business, thereby keeping alive the competitive stream.

Standardization is largely an engineering problem and might be expected to receive much of its impetus from professional engineering societies. The American Engineering Standards Committee was organized under such auspices in 1918; and in July, 1928, reorganized as the American Standards Association.

This committee has been working with trade associations, technical societies, and Government bureaus, but especially with the trade associations. It finds its principal work consists in reconciling conflicting interests of different industries. It has stated that standardization—

> simplifies manufacturing processes; it stabilizes production and employment, since it makes it safe for the manufacturer to accumulate stock during periods of slack orders, which he can not safely do with an unstandardized product; it broadens markets both

for the producer and for the consumer; it lowers cost to the public by making mass production possible; it enables buyer and seller to speak the same language, and makes it possible to compel competitive sellers to do likewise; it reduces selling cost; it stimulates research and makes for the elimination of antiquated methods and products; and by concentration on essentials, and the consequent suppression of confusing elements intended merely for sales effect, it helps to base competition squarely upon efficiency in production and distribution and upon intrinsic merit of product.

Lack of standardization was named as one of the important causes of waste in the report made in 1921 by the Committee on the Elimination of Waste in Industry. In six typical industries—the building trades, men's ready-made clothing, boots and shoes, printing, metal trades, and textile manufacturing—the waste preventable through standardization and simplification was found to range from 29 to 64 per cent, a total of $10,000,000,000 annually for these six industries.

Is Cooperative Undertaking

Standardization is in its very nature a cooperative undertaking which to be effective must command the support of all parties concerned. Technical societies and trade organizations, particularly the latter, provide the ready machinery for securing a group or national consensus on standards and for the promulgation of such standards.

Except in a few instances, where national standards have been made mandatory by law, standardization in this country has been developed and made effective through the voluntary cooperative action of the units and industries involved.

Pioneer work in the earlier development of standardization was done mainly by technical societies and the Government. However, trade associations have more recently become major factors in the movement and their importance is steadily increasing. It is obvious that industrial standards must be both useful and used. Standardization involves managerial decisions on industrial policies, hence executive management must be represented at the council tables concerned with standardization. Trade associations generally constitute the only systematic provision for cooperation by managers in the arrangement of standards of a national character.

Best Trade Associations Sponsor Work

The facts gathered in connection with the present inquiry show that most well-developed trade associations are concerned with some type of standardization work and standardization may be regarded as a major activity of many trade organizations. Not only are such groups engaged in formulating and adopting standards of their own but they are frequently represented on national standardization bodies organized for the establishment of standards on a national or interindustry basis.

About 200 trade and professional associations are represented on various committee projects of the American Standards Association, which became active following the war as a central clearing house to bring about systematic cooperation among the hundreds of groups attempting some sort of standardization work.

Likewise numerous trade associations are cooperating in the important standardization work of such other general standardizing agencies as the American Marine Standards Committee, American Society for Testing Materials, and the Central Committee on Lumber Standards. A considerable part of the work of the Bureau of Standards of the Department of Commerce is made effective through the voluntary cooperation of trade associations. The late Dr. Burgess, one-time director of the bureau, stated that the trade association is the normal medium through which the bureau cooperates with industry.

The fact that some associations engage in some sort of price reporting while the great majority of organized-trade groups have not interested themselves in such activity, it may be guessed, has no relationship or significance with respect to whether or not standardization work is carried on. But this is a situation with regard to which this inquiry should establish in some detail the extent to which open-price associations are similar to or different from other trade associations.

A.S.T.M. Elects Bassett President

William H. Bassett, The American Brass Company, Waterbury, Conn., has been elected president of the American Society for Testing Materials for 1934-1935. A member of the A.S.T.M. since 1903, he has been very active in its work, particularly in the non-ferrous field. He was a member of the Executive Committee, 1916-1918; and was vice-president of the A.S.T.M., 1932-1934. He holds membership in a large number of engineering and technical societies, is a past-president of the American Institute of Mining and Metallurgical Engineers, and a former director of the American Institute of Chemical Engineers.

H. S. Vassar, Public Service Electric and Gas Company, Irvington, N. J., was chosen vice-president. H. A. Anderson, Western Electric Company (Hawthorne Works); W. M. Barr, Union Pacific Railroad Company; L. S. Marsh, manager, Department of Inspection and Metallurgy, Inland Steel Company; and J. B. Rather, Socony-Vacuum Corporation, were elected members of the executive committee for the two-year term.

Glass Damage in Motor Accidents to be Studied

The marshalling of cold, indisputable facts on the amount of damage done by splintering, flying glass in automobile accidents will act as a special impetus toward preventing such calamities in the future. Morgan T. Ryan, registrar of motor vehicles in Massachusetts, has made such a listing in the annual report of the Registry of Motor Vehicles for Massachusetts.

Figures for that state show that of the 6,489 cases investigated in detail (16 per cent of the total number of accidents), in 1932, cuts by broken glass were present in the case of 78 fatalities and in 933 non-fatal accidents. In 1933, there were 13 killed and 981 injured in about the same number of investigated accidents.

New York, Pennsylvania, New Jersey, Massachusetts, Michigan, and Nebraska have already enacted laws demanding for their citizens the protection of non-shatterable glass in motor vehicles; Iowa has recently passed a similar law, while bills are now before the legislatures of Kentucky, Virginia, and the District of Columbia, which would make the use of non-shatterable glass mandatory in automobiles.

With the mounting toll of automobile accidents in the nation, such a step to eliminate an unnecessary hazard should be taken by every state.—*Sight Saving Review, June, 1934.*

(The American Standards Committee on Safety Glass recently named a technical committee to write specifications, methods of test, and performance requirements of safety glass.—EDITOR.)

Housewives Want Grade Labeling

By an overwhelming vote, women covered in a survey recently made by the National Association of Retail Grocers said that they read labels on canned and bottled foods before they buy them and that they favor Government grading and supervision of canned commodities in some manner similar to the Governmental inspection and stamping of meat, according to *National Grocers Bulletin* (April).

The Association conducted a survey among housewives in Minnesota, Des Moines, Iowa, and Chicago. The part of the questionnaire relating to Government standards read:

> "The Canned Fruit and Vegetable Grading Service of the Bureau of Agricultural Economics has set minimum grade limits for canned commodities. This department, however, has no power to enforce these standards and cannot prevent manufacturers or packers from using the various grade names on their products, though these products might not meet the qualification requirements of the bureau's standards. Would you be interested in seeing Government supervision and the stamp of the Bureau on canned and bottled food labels in some manner similar to the Governmental inspection and stamping of meat?"

The vote was 96.6 per cent in favor of this supervision and only 3.4 per cent against, it is shown.

"Yes" was the answer of 88.9 per cent of the women to the question: "Do you read the labels on canned and bottled foods before you buy them?" Another question was: "Do you take the merchant's word alone for a description of the contents?" The answer to this question was 26 per cent "yes", and 68 per cent "no".

The last question sought to find out where the consumer looks for protection as to purity, quality, and weight of goods when buying labeled canned or bottled foods. Only 31.8 per cent of the answers indicated the grocer, while 68 per cent stated that they relied on the name on the label for protection.

Production Men Now In More Important Role

Production men are playing a more important part in manufacturing establishments than ever before. Formerly it was their job to take anything emanating from the engineering department and make it. No matter how difficult the part or how much it might be simplified, their job was to make it without question. "Theirs not to question why, theirs but to do and die," much in the manner of Tennyson.

But it's a different story today. Now the engineering department consults production and frequently changes designs to secure lower machining costs. Production is also consulted before setting tolerances, or should be, not to jeopardize satisfactory performance where close tolerances are necessary, but to counteract the tendency of designers to play safe by demanding close tolerances whether needed or not.

This change of attitude has been brought about largely by the refusal of the production men to be blamed for excessive costs when the fault lay in the design. They now have another job to do in insisting on a revision of archaic methods of accounting which charge production with many items of overhead that belong elsewhere. Costs due to changes of design after a part has been put in

Hot-Dogs Standardized To Aid Digestibility

New York City's "fusion" administration has reached far into the labyrinth that was Tammany, and the frankfurter and roll—the humble hot-dog—must hereafter comply with standard specifications.

Concessionaires in city parks must sell hot-dogs containing:

Sixty per cent fresh-cured meat.
Forty per cent fresh pork trimmings.
Each frankfurter to bear stamp of Bureau of Animal Industries.
No coloring matter, such as paprika.
Young sheep, not hog, casings.
Only high-grade spices.
Ten-cent frankfurters must weigh eight to ten to the pound.
Five-cent frankfurters must weigh ten to twelve to the pound.

Rolls will have to be made of 100 per cent patent flour in order to contain sufficient gluten and will have to have a specified amount of milk solids.

production do not belong to production but to engineering. If these changes are made at the insistence of the sales department that is where the costs belong.

The production man has worries enough without shouldering those that belong elsewhere.—*American Machinist, April 11, 1934.*

A.S.T.M. to Revise Tests for Fabrics

Revisions of Standard Methods of Testing Woven Textile Fabrics (A.S.T.M. D 39-27; ASA L5-1931) were recommended by A.S.T.M. Committee D-13 on Textiles for action by the American Society for Testing Materials at its annual meeting in Atlantic City in June. It is expected that the revised standard will be ready for consideration by the American Standards Association later in the summer.

The revisions themselves consist of a clause covering methods for determining crimp in woven textile fabrics, and the addition of a standard test for determining shrinkage in woven cotton cloth. The first of these revisions was published as tentative in 1933 in connection with this standard. The shrinkage test, originally developed by the American Association of Textile Chemists and Colorists, was published by the A.S.T.M. as tentative in 1933 as a tentative revision to the A.S.T.M. Standard Specification for Tolerances and Test Methods for Certain Light and Medium Cotton Fabrics D 274-29.

The general application of the shrinkage test to various types of cotton fabrics was pointed out at the ASA conference on specifications for shrinkage of woven cotton yard goods, November 28, 1933. Subsequently, conferences of representatives of the American Society for Testing Materials, the National Bureau of Standards, and the American Association of Textile Chemists and Colorists agreed upon a uniform wording. It is expected that details of this test, which were similar in previous editions, will be identically worded in forthcoming publications.

The desirability of having this test approved as an American Standard was recognized and will be handled through the proposed addition of the shrinkage test to the present Standard Methods for Testing Woven Textile Fabrics.

66 Paving Brick Sizes Now Are Reduced to Six

The Simplified Practice Recommendation covering vitrified paving brick, R1-32, has been reaffirmed, without change, as of June 15, by the Standing Committee of the industry, the Division of Simplified Practice of the National Bureau of Standards has just announced.

The committee found that 91.5 per cent of the total shipments of this type of brick during 1933 were in accordance with the six sizes shown in the Simplified Practice Recommendation.

In 1921 vitrified paving brick was available in 66 different sizes. The original recommendation reduced this variety to 11, and subsequent conferences and surveys have resulted in a net reduction to six sizes.

Copies of the Recommendation are available from the ASA office, or from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents each.

Welding Society Endorses Two American Standards

The American Standards for Electric Arc Welding Apparatus (C52.1) and Resistance Welding Apparatus (C52.2) have been distributed to the members of the Board of Directors of the American Welding Society.

They have given careful consideration to the content of the standards and have endorsed the standards on behalf of the American Welding Society.

Limit Gages

the Physical Embodiment of Standards

LIMIT GAGES indicate strictly between what limits a dimension should lie—and consequently how much margin can be tolerated in meeting the requirements of a given design or practice.

The success of standards is based on this same principle. Those interested in developing a standard agree, first, upon what should be striven for, and then—realizing human inability to reach perfection—on how far the practical result may remain from the ideal and yet serve its purposes.

A system of limit gaging, to work out effectively, must be based upon a set of master gages. These coordinate the system, and harmonize its requirements.

Similarly, all industrial standardization work must be unified through a single, central body, if it is to reach its greatest effectiveness. Engineering societies, Government agencies, and industry—both consumers and manufacturers—created the AMERICAN STANDARDS ASSOCIATION 16 years ago to serve as this central body. Today this Association is the *national clearing house for standards*, with 42 Member-Bodies and 1233 Company Members.

The benefits of the AMERICAN STANDARDS ASSOCIATION'S work reach, directly or indirectly, into every manufacturing concern—whatever its business may be.

The AMERICAN STANDARDS ASSOCIATION stands ready to promote any standardization project whenever a demand for such work exists.

Is your company getting the most out of the national standards movement? If you want detailed information write to:

American Standards Association

29 W. 39th Street . . . . . New York